Docket No.: 050340-0180 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	:	Customer Number: 20277
Koudai YOSHIZAWA, et al.	:	Confirmation Number: 2745
Application No.: 10/519,554	:	Tech Center Art Unit: 1795
Filed: December 28, 2004	:	Examiner: PARSONS, Thomas H.

For: POLYMER ELECTROLYTE FUEL CELL

TRANSMITTAL OF APPEAL BRIEF

Mail Stop Appeal Brief
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Submitted herewith is Appellant's Appeal Brief in support of the Notice of Appeal filed December 2, 2008. Please charge the Appeal Brief fee of $540.00 to Deposit Account 500417.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due under 37 C.F.R. § § 1.17 and 41.20, and in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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Date: February 2, 2009

Please recognize our Customer No. 20277 as our correspondence address.

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APPEAL BRIEF

Mail Stop Appeal Brief
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Appeal Brief is submitted in support of the Notice of Appeal filed December 2, 2008, wherein Appellant appeals from the Primary Examiner's rejection of claims 1-21.

Real Party In Interest

This application is assigned to Nissan Motor Co., Ltd. by assignment recorded on December 28, 2004, at Reel 016808, Frame 0638.

Related Appeals and Interferences

Appellant is unaware of any related appeals and interferences.

Status of Claims

1. Claims pending: 1-21

2. Claims rejected: 1-21

3. Claims on appeal: 1-21

Status of Amendments

An after final amendment was filed November 6, 2008. The Examiner indicated the amendment would be entered for the purposes of appeal in the Advisory Action mailed November 19, 2008.

Summary of Claimed Subject Matter

An aspect of the invention, per claim 1, is a fuel cell (11) comprising a membrane electrode assembly (21), and a bipolar plate (24) having first and second opposing sides disposed outside the membrane electrode assembly (21) (page 2, line 26 to page 3, line 2 and page 7, lines 11 to 13 of the written description). The bipolar plate (24) is porous, and comprises a first gas passage (33) formed on a surface on the first side of the bipolar plate (24) facing the membrane electrode assembly (21) (page 3, lines 2 to 4; page 7, line 20; and page 7, line 26 to page 8, line 1 of the written description). A second gas passage (35) is formed on another surface on the second side of the bipolar plate (24) (page 3, lines 4 to 5 and page 8, lines 1 to 2 of the written description). A communicating passage (34) allows the first gas passage (33) and second gas passage (35) to communicate with each other (page 3, lines 5 to 7 and page 8, lines 4-6 of the written description). A gas inlet (31) introduces gas connected to one of the first gas passage (33) and second gas passage (35) (page 3, lines 8 to 10 and page 8, lines 7 to 11 of the written description). A gas outlet (37) discharges gas connected to the other of the first gas passage (33) and second gas passage (35) (page 3, lines 8 to 10 and page 8, lines 11 to 12 of the written description).

Another aspect of the invention, per claim 18, is a fuel cell (11) comprising a membrane electrode assembly (21), a bipolar plate disposed outside the membrane electrode assembly (21), and a cooling mechanism (25) which cools the bipolar plate (24) (page 3, lines 11 to 14 and page 23, lines 19 to 26 of the written description). The bipolar plate (24) is solid and comprises a gas inlet (31) for introducing gas, and a gas outlet (37) for discharging gas (page 3, lines 14 to 15; page 23, lines 25 to 26; and page 24, lines 4 to 9 of the written description). A gas diffusion layer (22) is provided between the membrane electrode assembly (21) and the bipolar plate (24) (page 25, lines 5 to 9 of the written description). First gas passages (33c) are formed on a surface on the side of the membrane electrode assembly (21), wherein one end of each first gas passage (33c) is connected to the gas inlet (31) and the other end of each first gas passage (33c) is connected to a return part (33d) (page 3, lines 15 to 18 and page 24, lines 4 to 8 of the written description). Second gas passages (33e) are formed parallel and adjacent to the first gas passages (33c) one after the other on the surface on the side of the membrane electrode assembly (21), wherein one end of each second gas passage (33e) is connected to the first gas passages (33c) via the return part (33d) and the other end of each second gas passage (33e) is connected to the gas outlet (37) (page 3, lines 18 to 19 and page 24, lines 5 to 9 of the written description). The cooling mechanism (25) cools the bipolar plate (24) so that the temperature of the gas flowing through the first gas passages (33c) is lower as the gas inlet (31) is nearer (page 3, lines 20 to 23 and page 24, lines 21 to 25 of the written description).

Grounds of Rejection To Be Reviewed By Appeal

1. Claims 1-3, 5, 6, and 11-14 were rejected under 35 U.S.C. § 103 as being unpatentable over Fujii et al. in view of Nelson et al. (US 6,150,049) and Kaufman et al. (US 4,588,661).

2. Claim 4 was rejected under 35 U.S.C. § 103 as being unpatentable over Fujii et al. in view of Nelson et al. and Kaufman et al. and further in view of Issacci et al. (US 2003/0129468).

3. Claims 7, 8, and 15-17 were rejected under 35 U.S.C. § 103 as being unpatentable over Fujii et al. in view of Nelson et al. and Kaufman et al. and further in view of Takahashi et al. (US 7,049,016).

4. Claims 9 and 10 were rejected under 35 U.S.C. § 103 as being unpatentable over Fujii et al. in view of Nelson et al. and Kaufman et al. and further in view of Ringel (US 5,932,366).

5. Claim 18 was rejected under 35 U.S.C. § 103 as being unpatentable over Fujii et al. in view of Nelson et al.

6. Claims 19-21 were rejected under 35 U.S.C. § 103 as being unpatentable over Fujii et al. in view Nelson et al. and further in view of Takahashi et al.

Argument

Rejections Under 35 U.S.C. § 103(a) over Fujii et al. in view of Nelson et al. and Kaufman et al.

Claims 1-3, 5, 6, and 11-14

The Examiner's Position:

Fujii et al. disclose a fuel cell comprising a membrane electrode assembly, monopolar plate (10), first gas passage (211) formed on a surface on one side of the membrane electrode assembly, a second gas passage (211b) formed on another surface on the opposite side of the first gas passage, a communicating passage (201) which allows the first and second gas passages to communicate with each other, a gas inlet (12C) and gas outlet (13C). The Examiner acknowledged that Fujii et al. do not disclose a bipolar plate. The Examiner considered it obvious to modify the apparatus of Fujii et al. by

incorporating bipolar plates as taught by Nelson et al. to increase hydration distribution along the membrane. The Examiner concluded that it would have been obvious to substitute the porous carbon plates of Kaufman et al. into the fuel cell of Fujii et al. and Nelson et al. to provide a more uniform gas distribution over the face of the respective anode and cathode to thereby improve the overall performance of the fuel cell.

Appellants' Position:

Fujii et al. fail to disclose the that the first gas passage is formed on a surface of the bipolar plate and the second gas passage is formed on another surface of the bipolar plate, as required by claim 1. Nelson et al. and Kaufman et al. do not cure the deficiencies of Fujii et al. Even if the gas diffusion layer of Nelson et al. and the porous carbon plate of Kaufman et al. are combined with Fujii et al, the present invention cannot be obtained, because the combination inevitably lacks the above-mentioned feature. The Examiner asserted that the bipolar plates taught by Nelson et al. increase hydration distribution along the membrane. However, there is no suggestion in Nelson et al. that bipolar plates increase hydration resistance. Rather, Nelson et al. disclose that it is a fluid flow plate comprising inlet and outlet manifolds, a plurality of reactant flow channels, at least one land, and at least one hole extending through the land; and the wicking action of the gas diffusion layer that provide adequate hydration (column 2, line 50 to col. 3, line 8).

Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kahn*, 441 F.3d 977, 986, 78 USPQ2d 1329, 1335 (Fed. Cir. 2006); *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Fine*, 837 F.2d 1071, 5

USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). There is no suggestion in Fujii et al., Nelson et al., and Kaufman et al. to modify the fuel cell of Fujii et al. to provide a bipolar plate having first and second opposing sides disposed outside the membrane electrode assembly, wherein the bipolar plate is porous, and comprises a first gas passage formed on a surface on the first side of the bipolar plate facing the membrane electrode assembly, and a second gas passage formed on another surface on the second side of the bipolar plate, as required by claim 1, nor does common sense dictate the Examiner-asserted modification. The Examiner has not established that there would be any obvious benefit in making all the asserted modifications of Fujii et al., Nelson et al., and Kaufman et al. to obtain the claimed fuel cell. *See KSR Int'l Co. v. Teleflex, Inc.*, 500 U.S. ____ (No. 04-1350, April 30, 2007) at 20.

The mere fact that references can be combined or modified does not render the resulting combination obvious unless the prior art also suggests the desirability of the modification. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Appellants submit that the combination of Fujii et al., Nelson et al., and Kaufman et al. does not suggest the claimed fuel cell.

The only teaching of the claimed fuel cell is found in Appellants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must not be based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The present invention uses a porous bipolar plate, and by allowing water to flow inside the bipolar plate, makes the water distribution in the cell uniform, and prevents flooding and dryout (page 6, lines 10 to 13 of the written description). The cited combination of references do not make water distribution uniform using a structure similar to Appellants' fuel cell.

Rejection Under 35 U.S.C. § 103(a) over Fujii et al. in view of Nelson et al. and Kaufman et al. and further in view of Issacci et al. (US 2003/0129468)

Claim 4

The Examiner's Position:

The Examiner acknowledged that the Fujii et al. combination did not disclose a first gas passage comprising an upstream gas passage whereof one end is connected to the gas inlet and the other end is closed, and downstream gas passage whereof one end is closed and the other end is connected to the communicating passage. The Examiner asserted that Issacci et al. disclose an upstream gas passage whereof one end is connected to the gas inlet and the other end is closed, and downstream gas passage whereof one end is closed and the other end is connected to the communicating passage. The Examiner concluded that it would have been obvious to modify the fuel cell of the Fujii et al. combination by incorporating the Issaccii et al. gas passage to enhance the flow of cathode gas to the catalytic area.

The Appellants' Position:

The combination of Fujii et al., Nelson et al., and Kaufman et al. with Issacci et al. does not suggest the claimed fuel cells because Issacci et al. do not cure the deficiencies of Fujii et al., Nelson et al., and Kaufman et al. Issacci et al. do not suggest a bipolar plate having first and second opposing sides disposed outside the membrane electrode assembly, wherein the bipolar plate is porous, and comprises a first gas passage formed on a surface on the first side of the bipolar plate facing the membrane electrode assembly, and a second gas passage formed on another surface on the second side of the bipolar plate, as required by claim 1.

Rejections Under 35 U.S.C. § 103(a) over Fujii et al. in view of Nelson et al. and Kaufman et al. and further in view of Takahashi et al. (US 7,049,016)

Claims 7 and 8

The Examiner's Position:

The Examiner averred that the Fujii et al. combination does not disclose a differential pressure regulating mechanism which regulates the differential pressure by regulating the pressure loss in the communicating passage. The Examiner noted that Takahashi et al. disclose a differential pressure regulating mechanism. The Examiner considered the limitation of "which regulates the differential pressure by regulating the pressure loss in the communicating passage" as not providing any additional limitation to the mechanism.

The Appellants' Position:

The combination of Fujii et al., Nelson et al., and Kaufman et al. with Takahashi et al. does not suggest the claimed fuel cells because Takahashi et al. do not cure the deficiencies of Fujii et al., Nelson et al., and Kaufman et al. Takahashi et al. do not suggest a bipolar plate having first and second opposing sides disposed outside the membrane electrode assembly, wherein the bipolar plate is porous, and comprises a first gas passage formed on a surface on the first side of the bipolar plate facing the membrane electrode assembly, and a second gas passage formed on another surface on the second side of the bipolar plate, as required by claim 1.

Claim 15

The Examiner's Position:

The Examiner asserted that the recited "so that the temperature of the gas discharged from the gas outlet is higher as the gas pressure or gas usage rate of the fuel cell is larger" did not further limit the controller. Because the controller of Takahashi appeared to be similar to the claimed controller, the Examiner maintained that it would appear capable of performing the claimed function.

Appellant's Position:

Claim 15 is allowable for at least the same reasons as claim 1. Claim 15 is further distinguishable because Takahashi et al. do not suggest the required controller. It is not sufficient for the Examiner to allege that merely because a prior art controller appears to be capable of performing the claimed function the controller is obviousness. It is well settled that a device that is programmed to perform a certain function is physically (structurally) distinct from a device that is not programmed to perform the function.

> [I]f a machine is programmed in a certain new and unobvious way, it is physically different from a machine without that program; its memory elements are differently arranged. The fact that these physical changes are invisible to the eye should not tempt us to conclude that the machine has not been changed. If a new machine has not been invented, certainly a "new and useful improvement" of the unprogrammed machine has been, and Congress has said in 35 U.S.C. § 101 that such improvements are statutory subject matter for a patent.

In re Bernhart, 417 F.2d 1395 (C.C.P.A. 1969).

Claim 16

The Examiner's Position:

The Examiner asserted that the recited "so that the temperature gradient of the gas flowing through the first gas passage increases as the temperature or humidity of the gas at the inlet is higher" did not further limit the controller. Because the controller of Takahashi appeared to be similar to the

claimed controller, the Examiner maintained that it would appear capable of performing the claimed function.

Appellant's Position:

Claim 16 is allowable for at least the same reasons as claim 1. Claim 16 is further distinguishable because Takahashi et al. do not suggest the required controller. It is not sufficient for the Examiner to allege that merely because a prior art controller appears to be capable of performing the claimed function the controller is obviousness. It is well settled that a device that is programmed to perform a certain function is physically (structurally) distinct from a device that is not programmed to perform the function.

> [I]f a machine is programmed in a certain new and unobvious way, it is physically different from a machine without that program; its memory elements are differently arranged. The fact that these physical changes are invisible to the eye should not tempt us to conclude that the machine has not been changed. If a new machine has not been invented, certainly a "new and useful improvement" of the unprogrammed machine has been, and Congress has said in 35 U.S.C. § 101 that such improvements are statutory subject matter for a patent.

In re Bernhart, 417 F.2d 1395 (C.C.P.A. 1969).

Claim 17

The Examiner's Position:

The Examiner asserted that the recited "so that the temperature gradient of the gas flowing through the first gas passage increases as the gas usage rate of the fuel cell is larger" did not further limit the controller. Because the controller of Takahashi appeared to be similar to the claimed controller, the Examiner maintained that it would appear capable of performing the claimed function.

Appellant's Position:

Claim 17 is allowable for at least the same reasons as claim 1. Claim 17 is further because Takahashi et al. do not suggest the required controller. It is not sufficient for the Examiner to allege that merely because a prior art controller appears to be capable of performing the claimed function the controller is obviousness. It is well settled that a device that is programmed to perform a certain function is physically (structurally) distinct from a device that is not programmed to perform the function.

> [I]f a machine is programmed in a certain new and unobvious way, it is physically different from a machine without that program; its memory elements are differently arranged. The fact that these physical changes are invisible to the eye should not tempt us to conclude that the machine has not been changed. If a new machine has not been invented, certainly a "new and useful improvement" of the unprogrammed machine has been, and Congress has said in 35 U.S.C. § 101 that such improvements are statutory subject matter for a patent.

In re Bernhart, 417 F.2d 1395 (C.C.P.A. 1969).

Rejections Under 35 U.S.C. § 103(a) over Fujii et al. in view of Nelson et al. and Kaufman et al. and further in view of Ringel (US 5,932,366)

Claims 9 and 10

The Examiner's Position:

The Examiner recognized that the Fujii et al. do not disclose that the communicating passage is a through-hole passing through the bipolar plate. The Examiner asserted that Ringel discloses that the communicating passage is a through-hole passing through the bipolar plate. The Examiner opined that it would have been obvious to modify the fuel cell of the Fujii et al. combination by incorporating the communicating passage of Ringel to provide a means for uniformly heating the fuel cell stack.

The Appellants' Position:

The combination of Fujii et al., Nelson et al., and Kaufman et al. with Ringel does not suggest the claimed fuel cells because Ringel does not cure the deficiencies of Fujii et al., Nelson et al., and Kaufman et al. Ringel do not suggest a bipolar plate having first and second opposing sides disposed outside the membrane electrode assembly, wherein the bipolar plate is porous, and comprises a first gas passage formed on a surface on the first side of the bipolar plate facing the membrane electrode assembly, and a second gas passage formed on another surface on the second side of the bipolar plate, as required by claim 1

Rejection Under 35 U.S.C. § 103(a) over Fujii et al. in view of Nelson et al.

Claim 18

The Examiner's Position:

Fujii et al. disclose a fuel cell comprising a membrane electrode assembly, monopolar plate (10), a cooling mechanism (10), first gas passage (211) formed on a surface on one side of the membrane electrode assembly, a second gas passage (211b) formed on another surface on the opposite side of the first gas passage, a communicating passage (201) which allows the first and second gas passages to communicate with each other, a gas inlet (12C) and gas outlet (13C). The Examiner acknowledged that Fujii et al. do not disclose a bipolar plate. The Examiner considered it obvious to modify the apparatus of Fujii et al. by incorporating bipolar plates as taught by Nelson et al. to increase hydration distribution along the membrane. It appears that the Examiner considered the cooling mechanism to be the same as the monopolar plate, as the Examiner has identified them both by the same reference number.

Appellant's Position:

As shown in Figs. 23-25 of the present disclosure, first gas passages 33c and the second gas passages 33e are formed one after another (alternately) and this feature enables overall water movement between the first gas passages 33c and the second gas passages 33e. Fujii et al. neither teach nor suggest this feature. Further, there is no suggestion in Nelson et al. that bipolar plates increase hydration resistance. Rather, Nelson et al. disclose that it is a fluid flow plate comprising inlet and outlet manifolds, a plurality of reactant flow channels, at least one land, and at least one hole extending through the land; and the wicking action of the gas diffusion layer that provide adequate hydration (column 2, line 50 to col. 3, line 8).

Furthermore, the Examiner improperly relied on the same feature of Fujii et al. (reference number 10) to be both the monopolar plate and the cooling mechanism, despite claim 18 expressly requiring two distinct components, a cooling mechanism and a bipolar plate. Clearly, the combination of Fujii et al. and Nelson et al. is missing at least one element of the claims. Nelson et al. do not cure the deficiencies of Fujii et al. Even if a gas diffusion layer is combined with Fujii et al., the combination lacks the above-mentioned features and overall water movement between the first passage 211A and the second passage 211B cannot be expected. The combination of Fujii et al. and Nelson et al. only enables water movement at a limited portion near the seal member CS1.

Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kahn*, 441 F.3d 977, 986, 78 USPQ2d 1329, 1335 (Fed. Cir. 2006); *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). There

is no suggestion in Fujii et al. and Nelson et al. to modify the fuel cell of Fujii et al. to provide a bipolar plate comprising first gas passages formed on a surface on the side of the membrane electrode assembly, wherein one end of each first gas passage is connected to the gas inlet and the other end of each first gas passage is connected to a return part, and second gas passages formed parallel and adjacent to the first gas passages one after the other on the surface on the side of the membrane electrode assembly, wherein one end of each second gas passage is connected to the first gas passages via the return part and the other end of each second gas passage is connected to the gas outlet, and the cooling mechanism, as required by claim 18, nor does common sense dictate the Examiner-asserted modification. The Examiner has not established that there would be any obvious benefit in making all the asserted modifications of Fujii et al. to obtain the claimed fuel cell. *See KSR Int'l Co. v. Teleflex, Inc.*, 500 U.S. ____ (No. 04-1350, April 30, 2007) at 20.

The mere fact that references can be combined or modified does not render the resulting combination obvious unless the prior art also suggests the desirability of the modification. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Appellants submit that the combination of Fujii et al. and Nelson et al. does not suggest the claimed fuel cell.

The only teaching of the claimed fuel cell is found in Appellants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must not be based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Rejections Under 35 U.S.C. § 103(a) over Fujii et al. in view of Nelson et al. and further in view of Takahashi

Claim 19

The Examiner's Position:

The Examiner averred that the Fujii et al. combination does not disclose a controller which functions to regulate the cooling performance of the cooling mechanism so that the temperature of the gas discharged from the gas outlet is larger as the gas pressure or gas usage rate of the fuel cell is larger. The Examiner noted that Takahashi et al. disclose a controller to regulate the cooling performance rate of the cooling mechanism. The Examiner asserted that the recited "so that the temperature of the gas discharged from the gas outlet is higher as the gas pressure or gas usage rate of the fuel cell is higher" did not further limit the controller. Because the controller of Takahashi appeared to be similar to the claimed controller, the Examiner maintained that it would appear capable of performing the claimed function.

Appellant's Position:

The combination of Fujii et al., Nelson, and Takahashi et al. do not suggest the claimed fuel cells because Takahashi et al. do not cure the deficiencies of Fujii et al. and Nelson et al. Takahashi et al. do not suggest the first gas passages formed on a surface on the side of the membrane electrode assembly, wherein one end of each first gas passage is connected to the gas inlet and the other end of each first gas passage is connected to a return part, and second gas passages formed parallel and adjacent to the first gas passages one after the other on the surface on the side of the membrane electrode assembly, as required by claim 18.

Claim 19 is further distinguishable because Takahashi et al. do not suggest the required controller. It is not sufficient for the Examiner to allege that merely because a prior art controller appears to be capable of performing the claimed function the controller is obviousness. It is well settled that a device that is programmed to perform a certain function is physically (structurally) distinct from a device that is not programmed to perform the function.

> [I]f a machine is programmed in a certain new and unobvious way, it is physically different from a machine without that program; its memory elements are differently arranged. The fact that these physical changes are invisible to the eye should not tempt us to conclude that the machine has not been changed. If a new machine has not been invented, certainly a "new and useful improvement" of the unprogrammed machine has been, and Congress has said in 35 U.S.C. § 101 that such improvements are statutory subject matter for a patent.

In re Bernhart, 417 F.2d 1395 (C.C.P.A. 1969).

Claim 20

The Examiner's Position:

The Examiner asserted that the recited "so that the temperature gradient of the gas flowing through the first gas passage increases as the temperature or humidity of the gas at the inlet is higher" did not further limit the controller. Because the controller of Takahashi appeared to be similar to the claimed controller, the Examiner maintained that it would appear capable of performing the claimed function.

Appellant's Position:

The combination of Fujii et al., Nelson, and Takahashi et al. do not suggest the claimed fuel cells because Takahashi et al. do not cure the deficiencies of Fujii et al. and Nelson et al. Takahashi et al. do not suggest the first gas passages formed on a surface on the side of the membrane electrode assembly, wherein one end of each first gas passage is connected to the gas inlet and the other end of each first gas passage is connected to a return part, and second gas passages formed parallel and adjacent to the first gas passages one after the other on the surface on the side of the membrane electrode assembly, as required by claim 18.

Claim 20 is further distinguishable because Takahashi et al. do not suggest the required controller. It is not sufficient for the Examiner to allege that merely because a prior art controller appears to be capable of performing the claimed function the controller is obviousness. It is well settled that a device that is programmed to perform a certain function is physically (structurally) distinct from a device that is not programmed to perform the function.

> [I]f a machine is programmed in a certain new and unobvious way, it is physically different from a machine without that program; its memory elements are differently arranged. The fact that these physical changes are invisible to the eye should not tempt us to conclude that the machine has not been changed. If a new machine has not been invented, certainly a "new and useful improvement" of the unprogrammed machine has been, and Congress has said in 35 U.S.C. § 101 that such improvements are statutory subject matter for a patent.

In re Bernhart, 417 F.2d 1395 (C.C.P.A. 1969).

Claim 20

The Examiner's Position:

The Examiner asserted that the recited "so that the temperature gradient of the gas flowing through the first gas passage increases as the gas usage rate of the fuel cell is larger" did not further limit the controller. Because the controller of Takahashi appeared to be similar to the claimed controller, the Examiner maintained that it would appear capable of performing the claimed function.

Appellant's Position:

The combination of Fujii et al., Nelson, and Takahashi et al. do not suggest the claimed fuel cells because Takahashi et al. do not cure the deficiencies of Fujii et al. and Nelson et al. Takahashi et al. do not suggest the first gas passages formed on a surface on the side of the membrane electrode assembly, wherein one end of each first gas passage is connected to the gas inlet and the other end of

each first gas passage is connected to a return part, and second gas passages formed parallel and adjacent to the first gas passages one after the other on the surface on the side of the membrane electrode assembly, as required by claim 18.

Claim 21 is further distinguishable because Takahashi et al. do not suggest the required controller. It is not sufficient for the Examiner to allege that merely because a prior art controller appears to be capable of performing the claimed function the controller is obviousness. It is well settled that a device that is programmed to perform a certain function is physically (structurally) distinct from a device that is not programmed to perform the function.

> [I]f a machine is programmed in a certain new and unobvious way, it is physically different from a machine without that program; its memory elements are differently arranged. The fact that these physical changes are invisible to the eye should not tempt us to conclude that the machine has not been changed. If a new machine has not been invented, certainly a "new and useful improvement" of the unprogrammed machine has been, and Congress has said in 35 U.S.C. § 101 that such improvements are statutory subject matter for a patent.

In re Bernhart, 417 F.2d 1395 (C.C.P.A. 1969).

Conclusion

Based upon the arguments submitted supra, Appellant respectfully submits that the Examiner's rejections under 35 U.S.C. § 103 are not legally viable. Appellant, therefore, respectfully solicits the Honorable Board to reverse the Examiner's rejection of claims 1-3, 5, 6, and 11-14 as being unpatentable as evidenced by Fujii et al., Nelson et al., and Kaufman et al.; claim 4 as being unpatentable as evidenced by Fujii et al., Nelson et al., Kaufman et al., and Issacci et al.; claims 7, 8, and 15-17, as being unpatentable as evidenced by Fujii et al., Nelson et al., Kaufman et al., and Takahashi et al.; claims 9 and 10 as being unpatentable as evidenced by Fujii et al., Nelson et al., Kaufman et al., and Ringel; claim 18 as being unpatentable as evidenced by Fujii et al. and Nelson et

al.; and claims 19-21 as being unpatentable as evidenced by Fujii et al., Nelson et al., and Takahashi et al.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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Please recognize our Customer No. 20277 as our correspondence address.

CLAIMS APPENDIX

1. A fuel cell, comprising:

a membrane electrode assembly, and

a bipolar plate having first and second opposing sides disposed outside the membrane electrode assembly, wherein:

the bipolar plate is porous, and comprises:

a first gas passage formed on a surface on the first side of the bipolar plate facing the membrane electrode assembly,

a second gas passage formed on another surface on the second side of the bipolar plate,

a communicating passage which allows the first gas passage and second gas passage to communicate with each other,

a gas inlet for introducing gas connected to one of the first gas passage and second gas passage, and

a gas outlet for discharging gas connected to the other of the first gas passage and second gas passage.

2. The fuel cell as defined in Claim 1, wherein:

the gas inlet is connected to the first gas passage,

the gas outlet is connected to the second gas passage, and

gas introduced from the gas inlet flows through the first gas passage, communicating passage and second gas passage in that order, and is discharged from the gas outlet.

3. The fuel cell as defined in Claim 2, wherein:

the second gas passage is formed on the second side of the bipolar plate so that the second gas passage is back-to-back with the first gas passage, and the gas outlet is formed on the opposite side of the gas inlet so that the gas outlet is underneath the gas inlet.

4. The fuel cell as defined in Claim 2, wherein the first gas passage comprises:

an upstream gas passage whereof one end is connected to the gas inlet and the other end is closed, and

a downstream gas passage whereof one end is closed and the other end is connected to the communicating passage.

5. The fuel cell as defined in Claim 2, wherein:

the pressure of the gas flowing through the first gas passage is higher than the pressure of the gas flowing through the second gas passage.

6. The fuel cell as defined in Claim 5, wherein:

a differential pressure between the first gas passage and the second gas passage, is produced by a pressure loss in the communicating passage.

7. The fuel cell as defined in Claim 6, further comprising:

a differential pressure regulating mechanism which regulates the differential pressure by regulating the pressure loss in the communicating passage.

8. The fuel cell as defined in Claim 7, wherein:

the differential pressure regulating mechanism regulates the pressure loss according to the load of the fuel cell.

9. The fuel cell as defined in Claim 2, wherein:

the communicating passage is a through-hole passing through the bipolar plate.

10. The fuel cell as defined in Claim 9, wherein:

the through-hole has a smaller cross-sectional area than the cross-sectional area of the first gas passage.

11. The fuel cell as defined in Claim 2, wherein:

the communicating passage is an external manifold provided outside the bipolar plate which allows the first gas passage and second gas passage to communicate.

12. The fuel cell as defined in Claim 2, comprising:

a cooling mechanism which cools the bipolar plate, wherein:

the cooling mechanism cools the bipolar plate so that the temperature of the gas flowing through the second gas passage is lower than the temperature of the gas flowing through the first gas passage.

13. The fuel cell as defined in Claim 12, wherein:

the cooling mechanism cools the bipolar plate from the second side.

14. The fuel cell as defined in Claim 2, comprising a cooling mechanism which cools the bipolar plate wherein:

the cooling mechanism cools the bipolar plate so that the temperature of the gas flowing through the first gas passage is lower as the gas inlet is nearer.

15. The fuel cell as defined in Claim 14, comprising:

a controller which functions to:

regulate the cooling performance of the cooling mechanism so that the temperature of the gas discharged from the gas outlet is higher as the gas pressure or gas usage rate of the fuel cell is larger.

16. The fuel cell as defined in Claim 15, wherein:

the controller regulates the cooling performance of the cooling mechanism so that the temperature gradient of the gas flowing through the first gas passage increases as the temperature or humidity of the gas at the gas inlet is higher.

17. The fuel cell as defined in Claim 16, wherein:

the controller further functions to regulate the cooling performance of the cooling mechanism so that the temperature gradient of the gas flowing through the first gas passage increases as the gas usage rate of the fuel cell is larger.

18. A fuel cell, comprising:

a membrane electrode assembly,

a bipolar plate disposed outside the membrane electrode assembly and

a cooling mechanism which cools the bipolar plate, wherein:

the bipolar plate is solid, and comprises:

a gas inlet for introducing gas,

a gas outlet for discharging gas,

a gas diffusion layer provided between the membrane electrode assembly and the bipolar plate,

first gas passages formed on a surface on the side of the membrane electrode assembly, wherein one end of each first gas passage is connected to the gas inlet and the other end of each first gas passage is connected to a return part, and

second gas passages formed parallel and adjacent to the first gas passages one after the other on the surface on the side of the membrane electrode assembly, wherein one end of each second gas passage is connected to the first gas passages via the return part and the other end of each second gas passage is connected to the gas outlet, and

the cooling mechanism cools the bipolar plate so that the temperature of the gas flowing through the first gas passages is lower as the gas inlet is nearer.

19. The fuel cell as defined in Claim 18, comprising:

a controller which functions to:

regulate the cooling performance of the cooling mechanism so that the temperature of the gas discharged from the gas outlet is higher as the gas pressure or gas usage rate of the fuel cell is higher.

20. The fuel cell as defined in Claim 19, wherein the controller further functions to:

regulate the cooling performance of the cooling mechanism so that the temperature gradient of the gas flowing through the first gas passages increases as the temperature or humidity of the gas at the gas inlet is higher.

21. The fuel cell as defined in Claim 20, wherein the controller further functions to:

regulate the cooling performance of the cooling mechanism so that the temperature gradient of the gas flowing through the first gas passages increases as the gas usage rate of the fuel cell is higher.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.